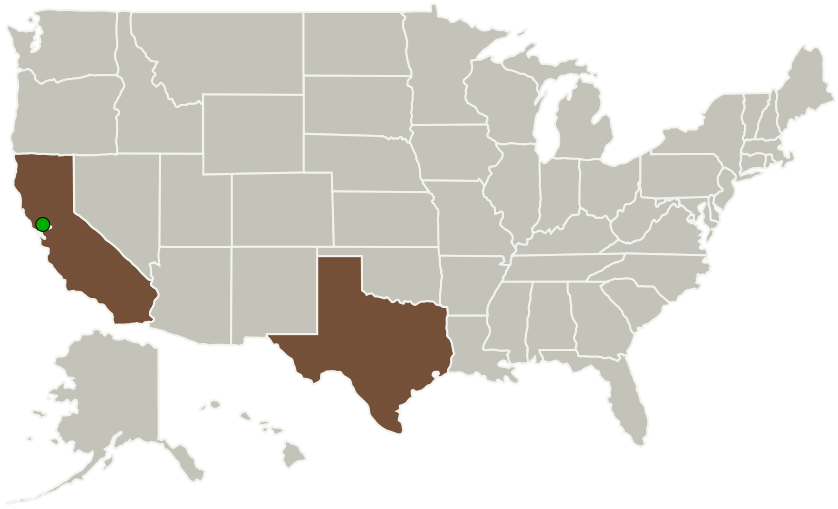
Integration of Notification with 3D Visualization of Rover Operations, Phase II

Completed Technology Project (2011 - 2013)

Project Introduction

Future NASA exploration missions will rely on remote operation of robots. As human explorers move further away from Earth, robotic precursors will scout destinations and robotic assistants will perform tasks to reduce astronaut risk and workload. 3D visualization is a key component of how humans will interact with robots for these missions. When the operator engages a robot using visualization, there is a risk that he or she will become too focused on what is happening now in the vicinity of the robot and will not be aware of other important events that are not apparent in the field of view. This risk only increases when operations involve multiple robots. It is essential to ensure that the user does not miss important events that do not manifest in the vicinity of the robot. TRACLabs, Carnegie Mellon University (CMU), and Stinger Ghaffarian Technologies (SGT) propose to develop software for notifying users of 3D visualization about important notices without distracting users unnecessarily or adding to the visual clutter around the robot avatar. This software will monitor events from the robot or user, identify which events should be brought to the user's attention, and alert users in the 3D pane. The appearance of alerts is altered to shift a user's attention to new notices based on an assessment of the importance and urgency of the notice specific to the user. Thus the same notice may be presented to different users in different ways. Because notices are anchored to a screen overlay, they are visible regardless of what location the user is viewing in the 3D space. In Phase II we will implement this software and evaluate its effectiveness for NASA missions.

Primary U.S. Work Locations and Key Partners



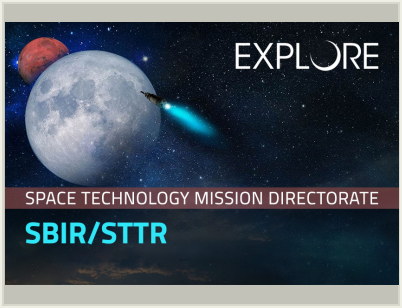


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Table of Contents

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
TRACLabs, Inc.	Lead Organization	Industry	Webster, Texas
Ames Research Center(ARC)	Supporting Organization	NASA Center	Moffett Field, California
Carnegie Mellon University	Supporting Organization	Academia	Pittsburgh, Pennsylvania
Carnegie Mellon University - Silicon Valley	Supporting Organization	Academia	Moffett Field, California

Primary U.S. Work Locations	
California	Texas

Project Transitions

July 2011: Project Start

June 2013: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/139016)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

TRACLabs, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

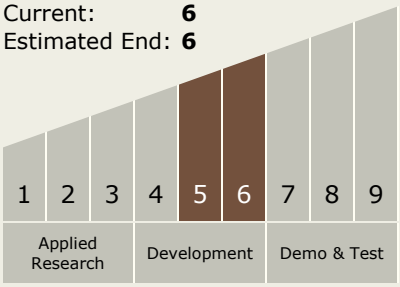
Carlos Torrez

Principal Investigator:

Debra L Schreckenghost

Technology Maturity (TRL)

Start: **5**
Current: **6**
Estimated End: **6**



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Technology Areas

Primary:

- TX04 Robotic Systems
  - TX04.4 Human-Robot Interaction
    - TX04.4.1 Multi-Modal and Proximate Interaction

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System